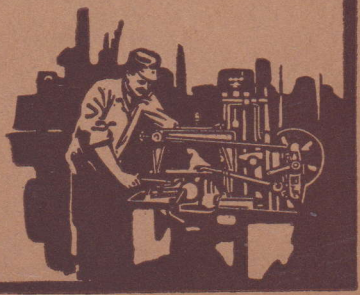
Hacksaw -ology



Hacksaw -ology

Helpful Hints on the Care and Use of Hack Saw Blades

from
SIMONDS SAW AND STEEL CO.
"The Saw Makers"
FITCHBURG, MASSACHUSETTS

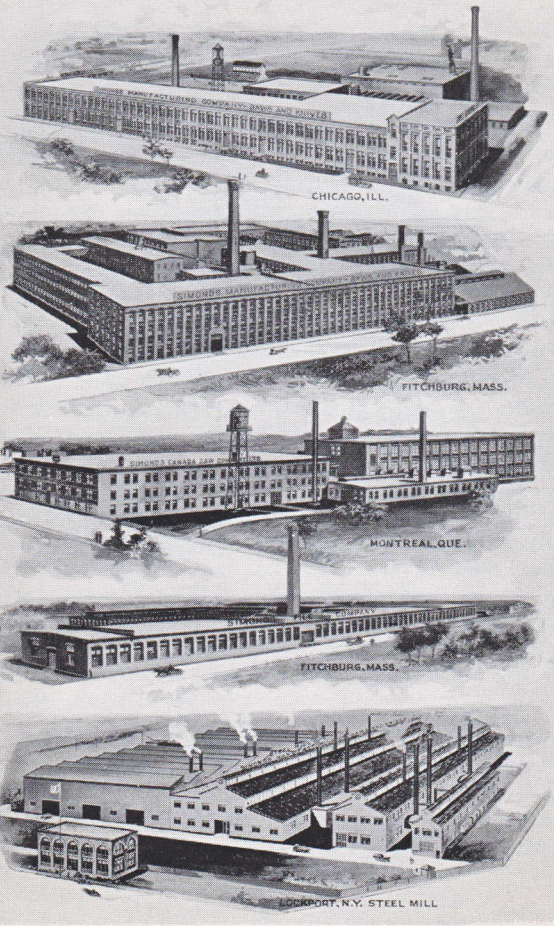
Introduction

In presenting this revised issue of "Hacksaw-ology" it is our aim to provide users of Hack Saw Blades, both for hand and power cutting, a handy reference booklet of practical suggestions in the care, selection, and use of Hack Saw Blades.

From our own wide study and long experience as makers of the best Hack Saw Blades we have drawn the helpful information in these pages.

Very truly yours,

Simonds Saw and Steel Co.



The Four Factories and Steel Mill of the
Simonds Saw and Steel Company

Hacksaw-ology

A Bit of History The origin of the word "Hack Saw" is rather obscure; it is supposed to have come down from the day when the farmer made saws for cutting bone and similar materials by hacking the back of an old scythe blade with a chisel. This, of course, made the roughest kind of a rough saw. As we know it, the word "hack saw" is applied to a fine tooth saw that has its narrow blade stretched in a frame for cutting metal.

At first manufacturers of saw blades made them from untempered steel. The teeth were punched and had no set. The Simonds Company, founded by Abel Simonds in 1832, began making tempered steel cutting edge tools and it was but natural that its broad experience in the heat-treating of steel to make saws should lead it at a later time into the manufacture of hack saw blades. With this specialized knowledge in hardening and tempering steel the Simonds Hack Saw Blades soon set the pace for hack saw blade manufacturers.

The Simonds Company now makes two types of hand hack saw blades: "Hard Edge," indicating that the toothed edge only is hardened, and "All Hard," indicating that the entire blade is hardened. Power saw blades, for shop saw use, are "All Hard."

Steel Simonds Hack Saw Steel, containing a high tungsten content and furnished in proper gauges and multiples, is made in Simonds' own steel mill at Lockport, N. Y., of virgin ore, and conforms to the most rigid specifications as to analysis, alloys, rolling heat and size, resulting in exceptional quality and uniformity. As the quality of a hack saw blade is no better than the quality of steel used, our advantage at the outset is self-evident.

This steel is rolled into sheets, sheared to length, and saws blanked with grain of steel running lengthwise with the blade. This makes the Simonds blades tougher than if sheared crosswise to the steel grain. After blanking, the blades are ready for milling. Small quantities are clamped rigidly onto milling machine beds and milling cutters are run at a very low speed to make perfectly formed, even teeth.

Set The next operation is the set of the teeth, accomplished through our own devised method. Our setting dies are accurately ground for proper clearance and so firmly anchored in our machines that uniformity and evenness is assured with minimum kerf, yet Simonds saws will hold proper clearance and be free cutting until the blade is worn out. Pinching is practically unheard of in Simonds blades due to this exact setting principle.

Your attention is directed to the character of our set. Notice the one straight tooth (raker tooth) in every three: this tooth is not set and

is, therefore, slightly longer than the set teeth. In cutting, this tooth breaks up the chips into small pieces which do not clog the gullets, making Simonds saws faster cutting and longer wearing. Fine teeth blades have a wavy set which helps to eliminate the shelling of teeth when cutting thin sections.

Scientifically Hardened In hardening Simonds blades extreme care is exercised to maintain the heats in our furnaces at even temperatures with such instruments as recording pyrometers in constant use. All guesswork is eliminated in our heat treatment.

The quenching of the heated blade occurs immediately upon its removal from the furnace. No time lapse takes place nor any air gap between furnace and cooling bath, consequently our blades after quenching are uniformly hard. The hardened blade is then tempered at proper heat to relieve strains and toughen it.

Our method of hardening our "Hard Edge" blades is on the same principle as hardening a cold chisel: the cutting edge only is hardened and consequently can be left considerable harder than if the blade were hardened all over. Hence, it will outcut any All Hard blade on the market at least 25%, our own Simonds All Hard blades included.

Rigid Inspection Our inspection is as frequent as it is rigid. Inspection takes place after each operation—milling, setting, trimming, hardening, tempering, etc.—while

the finished blades are subjected to a further and final inspection. If any blades (no matter how large a quantity) are not up to Simonds high standard of quality, they are rejected and broken up—the guarantee to you and your trade of hacksaw blade uniformity.

About Hack Saw Teeth Hand Use

Our standard hand blades are made 8″, 9″, 10″ and 12″ in length, ½″ wide and .025″ thick, with 14, 18, 24 or 32 teeth per inch. The 14 and 18 tooth blades are given the regular set, i. e.—right, left and raker. The 24 and 32 tooth blades are given the wavy set.

The different teeth are used as outlined on the next page.

14—for cutting soft steel, iron solids and rails.

18—for cutting tool steel, iron pipe, hard metals, light angle iron.

24—for cutting brass, copper, drill rod, medium tubing, sheet metals.

32—for cutting thin tubing and thin sheet metals.

In sawing thin sections, always be sure that two teeth are engaged in the cut at the same time. Otherwise the teeth will "straddle" the work and shell off.

From 40 to 50 strokes per minute is the most efficient speed for hand cutting. Care should be taken in starting new blades, using light pressure so the teeth will not dig in too rapidly.

Power Saw Blades Power saw blades can be divided into four classes: Light, Medium, Heavy and Extra Heavy.

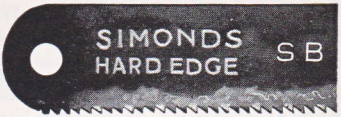
Light power saw blades are 12″ in length x 5/8″ wide x .032 thick, and 14″ in length x 3/4″ wide x .032 thick with 12, 14, or 18 teeth per inch.

14 Teeth to the inch

For Soft Steels, Iron Solids and Rails

18 Teeth to the inch

For Tool Steel, Iron Pipe, Hard Metals and Light Angle Iron



24 Teeth to the inch

For Brass, Copper, Drill Rod, Sheet Metal and Medium Tubing

32 Teeth to the inch

Thin Sheet Metal and Tubing

Medium power saw blades are 12″ and 14″ in length x ¾″ wide x .049 thick with 9, 12, or 14 teeth per inch.

Heavy power saw blades are from 12″ to 24″ in length, 1″ wide x .049 thick with 9 teeth per inch. Some of the shorter lengths are furnished with 12 or 14 teeth per inch.

Extra heavy power saw blades are from 14″ to 24″ in length, 1″ wide x .065 thick with 9 teeth per inch.

Power saw blades should be run at not over 60 strokes per minute if cutting dry, but the speed can be increased to 100 or 120 strokes if a cooling lubricant is used.

Hints on Cutting off Stock by Hand After selecting the proper blade, strain well in frame. The proper strain or tension is important to insure true cutting and to prevent breakage of blades.

Insert saw in frame with teeth pointing away from the operator. Be sure that blade is perpendicular and tight. The "Hard Edge" saw should be strained tighter than the "All Hard." Material to be cut should be rigid and placed so as to engage the maximum number of teeth throughout the cut. This is especially true when cutting structural steel, channel or similar material. At least two teeth should always be in contact with the work, so the teeth will not "straddle."

Have the Blade Cut and not Rub Start the cut easily using the same motion as in filing. Be sure to put on sufficient

pressure to make the teeth cut and not slide or slip on the metal. If you do not use enough pressure when starting the cut, you will allow the saw to rub rather than cut and the cutting points of the blade will soon glaze and become blunt. Hack saws are for cutting, not rubbing. After the first few strokes retighten the saw in the frame.

Always Lift Saw on Return Stroke At the end of forward stroke lift the saw slightly, to avoid dragging or rubbing the teeth on the stock during the return stroke. Using pressure on the return stroke will wear off the cutting edge and reduce the efficiency of the saw.

Advantage of Slow Steady Stroke Make 40 to 50 strokes per minute your maximum speed and you will finish the job quicker than at 60-70 strokes, besides prolonging the life of the saw. If you desire fast cutting, operate the blade slowly and use sufficient pressure.

Cutting Thin Stock and Tubing Many hack saw troubles come from trying to cut thin metal without the proper saw or proper precautions. For thin metal a saw blade should be selected with teeth fine enough so that two or more teeth will engage the work at once; for, if the spacing is so coarse that the metal is allowed to catch between two

	Length in.	Width in.	Thickness Gauge	Standard Teeth per inch				Regular Blade for General Work	List Price	Standard Package
HAND BLADES	8	½	.025 = 23	14	18	24	32	**18**	8.00	½ gross
"Hard Edge" and "All Hard"	9	½	.025 = 23	14	18	24	32	**18**	9.00	½ gross
	10	½	.025 = 23	14	18	24	32	**18**	10.00	½ gross
	12	½	.025 = 23	14	18	24	32	**18**	12.00	½ gross
LIGHT MACHINE BLADES "All Hard"	12	⅝	.032 = 21	12	14	18		**14**	17.88	½ gross
	12	¾	.032 = 21	12	14	18		**14**	21.36	½ gross
	14	¾	.032 = 21	12	14			**14**	24.36	½ gross
MEDIUM MACHINE BLADES "All Hard"	12	¾	.049 = 18	9	12	14		**12**	28.92	⅓ gross
	14	¾	.049 = 18	9	12	14		**12**	33.12	⅓ gross
HEAVY MACHINE BLADES "All Hard"	12	1	.049 = 18	9	12	14		**9**	37.92	⅓ gross
	14	1	.049 = 18	9	12	14		**9**	43.56	⅓ gross
	16	1	.049 = 18	9	12	14		**9**	49.08	⅓ gross
	17	1	.049 = 18	9	12	14		**9**	51.72	⅓ gross
	18	1	.049 = 18	9	12			**9**	54.36	⅓ gross
	20	1	.049 = 18	9				**9**	59.52	⅓ gross
	24	1	.049 = 18	9				**9**	70.32	⅓ gross
EXTRA HEAVY MACHINE BLADES "All Hard"	14	1	.065 = 16	9				**9**	50.88	¼ gross
	16	1	.065 = 16	9				**9**	56.88	¼ gross
	17	1	.065 = 16	9				**9**	59.52	¼ gross
	18	1	.065 = 16	9				**9**	62.04	¼ gross
	20	1	.065 = 16	9				**9**	67.92	¼ gross
	24	1	.065 = 16	9				**9**	79.32	¼ gross

Unless specified "Regular" Blades will be furnished.

All Hand Blades measure from centre to centre of holes.

14 inch and 17 inch Power Blades measure 13½ inches and 16½ inche

All other Power Blades measure from centre to centre of holes.

The recommendations on this chart should be taken in a general ra indicates.

CK SAW CHART

Lbs. per Gross	No. of Teeth for Material to be Cut							
	Cast Iron Solid Babbitt, Brass, Copper, Bronze, Aluminum	Rails-Solid Stock, Cold Rolled Mach. Steel, Soft Steel, Annealed Tool Steel Heavy Structural	Tool Steel, Hard Metals, Light Structural	Heavy-Angles; Channels, Tee Iron, High Speed Steel	Steel Pipe, Iron Pipe, Brass Pipe, Copper Pipe, Conduit	Light-Angles, Channels, Tee Iron, Ornamental Iron	Drill Rod Medium Sheet Metals and Tubing	Thin Sheet Metals and Thin Tubing
4	14	14	18	18	24	24	24	32
4½	14	14	18	18	24	24	24	32
5	14	14	18	18	24	24	24	32
6	14	14	18	18	24	24	24	32
9¾	12	14	14	18				
11¾	12	14	14	18				
13	12	14	14					
18	9	12	14	14				
20¼	9	12	14	14				
23¾	9	9	12	14				
28	9	9	12	14				
32½	9	9	12	14				
34¾	9	9	12	14				
35½	9	9	12					
41	9	9						
46	9	9						
53¾	9	9						
2	9	9						
4	9	9						
73¾	9	9						
3	9	9						
61¼	9	9						

s between centres of holes respectively.

ather than a specific sense and applied as the judgment of the user

teeth, the tendency will be to strip the teeth of the blade. When sawing thin stock it should be well supported in the vise; if the work will permit it should be held between two pieces of wood (see illustration below) and the whole sawed together. The additional cutting that the blade must do in working down through the combination protects the teeth and prevents them from catching on the side of the metal, and, as a consequence, stripping the teeth.

Whenever possible, sheet metal should be sawed with the blade at an angle to the work, thus presenting the greatest possible number of teeth to the work at one time.

Simonds Hard Edge Blades for hand use are made with 14, 18, 24, and 32 teeth to the inch; 18 teeth for general work, 24 teeth for cutting brass, copper, drill rod, medium tubing and sheet metals, and 32 teeth for cutting thin tubing and thin sheet metals. The Simonds Hard Edge Blade is so tempered that the risk of stripping teeth is reduced to a minimum, and when properly used, this blade is unbreakable.

With the ordinary hack saw blade the trouble with cutting tubing is that the operation is too easy. The saw goes through so quickly that the thin walls of the tubing catch between the teeth of an ordinary hack saw blade thus stripping the teeth. To overcome this difficulty the hack saw blade should be one

with very fine teeth, tempered especially for thin tube cutting.

Hints on Power Cutting In using the power machine hack saw blade, first find out whether the machine is of the draw-cut or push-stroke type and insert blade accordingly, having the rake of the teeth in the direction in which the cutting is done. Be sure to strain blade tightly in frame.

With the rapid growth of power sawing, it becomes more and more essential that the character of material to be cut and its shape be carefully considered in the design, manufacture and selection of the blade, if highest efficiency is to be obtained.

Careful investigation and years of experiment determined just what features in the saw give greatest efficiency in the cutting of each particular material under various working conditions.

Instructions for Use See that saw is straight in frame and tight. Teeth should always point in direction the cut is to be made. Majority of machines are draw-cut and teeth should point away from the operator. In push-cut machine the teeth should be reversed and point toward operator.

Have material firmly clamped in vise. Start the cut with comparatively light pressure and relieve the saw of part of weight by holding frame with hand to prevent teeth from crowding into material. After few strokes retighten saw and release frame.

Be Sure Machine lifts on Return Stroke Too much weight put upon a new saw will destroy it quickly, while insufficient pressure will allow saw to slip or slide without cutting and dull the teeth rapidly.

Feed and Speed Don't be afraid to run the saw slowly.

The name "High Speed" was derived from the speed of production and should not be confused with the number of strokes per minute. The rate of production depends directly upon the rate at which the saw goes through the stock. Therefore, use as much feed or pressure as practical.

Only by comparison can the exact feed and speed, which will give best results with each type of blade and kind of material, be determined for the individual machine.

For maximum efficiency increase pressure as saw dulls, thus assuring a cutting rather than rubbing action. It is evident that more pressure should be used when cutting heavy stock than for light stock.

The following, however, will serve as a general guide for the proper operation of power saws:

Feed or Pressure when starting new blade on hack saw machine		Machine	With or Without Solution	Unannealed Tool Steel and Hard Metals	Annealed Tool Steel	Machinery Steel and Soft Metal
Size Blades	Weight Pounds			Strokes per minute	Strokes per minute	Strokes per minute
½—.025	12					
⅝—.032	20	Light	Without	40	50-60	50-60
¾—.032	24	Medium	Without	40	50-60	50-60
¾—.049	40	Medium	With	60	65-90	100-110
1—.049	44	Heavy	With	60	90	110-120
1—.065	65	Ex.Heavy	With	60	90	110-120

Cooling Compound As its principal action is one of cooling, there is sufficient lubricating effect with even the cheapest cutting compounds, provided the quantity used is great enough to produce the necessary cooling. Deluge the blade and work, as high speed cutting generates heat which draws the temper of the blade. Do not use oil.

Always use cutting compound **except when cutting iron castings** and the output will be greatly increased, doubled at least.

Why Hacksaw Blades Break "More hack saws are broken than wear out," is a truth that cannot be impressed too strongly. Most broken blades may be traced to one of the following four causes: First, too heavy pressure applied in cutting a small surface. The blade gives at the point of

the pressure, buckles and consequently breaks. Second, too weak strain on the blade. When a slight over-pressure is exerted on a weakly strained blade the blade at once buckles and breaks. Third, cramping or binding. If the sawing is not done evenly there is a side strain on the blade and the result is a broken hack saw blade. Fourth, work held insecurely. Under the cutting action, such work becomes loose, and the result is another broken blade.

Hack Saw Blade Economy Hack saw economy can be effected by the purchaser as well as by the individual workman. Use only the best quality of blades, as they are always the cheapest in the long run. Select the proper number of teeth to the inch. Give special attention to these two factors. They can eliminate a great deal of your hack saw trouble and expense.

In use in the shop, other precautions may be taken that will diminish the hack saw bill. First the stock-room keepers should be instructed to judge the general uses to which a blade will be put and hand them out accordingly. The best way is to specify a certain length of blade and number of teeth for every production job. This should be followed up by the foreman to see that men do not use blades of the wrong pitch.

For general work in hand cutting, we recommend our 18 teeth "Hard Edge," this blade being practically unbreakable in use.

Buy Your

SIMONDS Hack Saw Blades

by the chart
on pages 12-13

Each blade has a special use—consult the chart. Buy accordingly when you do that kind of cutting exclusively. Never attempt to cut thin metal with a coarse tooth saw. It will ruin the blade.

If you wish to improve your cutting results and reduce your blade expense, buy

SIMONDS

Metal Cutting Band Saw Blades

SPRING TEMPER TYPE FOR HIGH SPEED MACHINES

For Sawing Brass, Aluminum, Thin Sheet Steel

Band Saw operators know the great economical value of a *blade that can be refiled and set when dull.* This type of blade will do a remarkable amount of cutting of the softer metals such as brass and aluminum before dulling the points of the teeth and can then be resharpened at a nominal cost.

We especially recommend this blade for cutting such materials as thin sheet steel as used on automobile bodies and fenders, light structural shapes, fibre, bakelite, brass tubing, etc.

When ordering specify the width, length, number of teeth to the inch, character of material to be cut; its size and shape; also make and speed of machine on which the blade is to operate.

List Prices—Spring Temper

Width, Inches	Thickness	Price per Foot	Price Brazing
1/4	.025		
3/8	.025		
1/2	.025		
5/8	.032		
3/4	.032		
1	.032		
1 1/4	.035		
1 1/2	.035		

Standard number of teeth per inch, 6 to 12.

Saw Blades of different widths, heavier gauge, or with finer teeth than listed are special. Prices quoted on application.

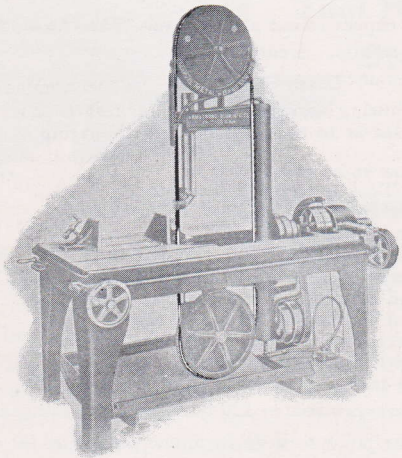
For the convenience of customers desiring to braze or join their own saws we supply them in coils ranging from 200 feet to 600 feet.

If you wish to improve your cutting results and reduce your blade expense, buy

SIMONDS

Metal Cutting Band Saw Blades

HARD EDGE TYPE



Simonds Saws are are made to meet an urgent demand for a Metal Cutting Band Saw that will cut true and square and hold its keen cutting edge.

Simonds special alloy steel blades are the most dependable blades on the market. They are made for any style of machine, and with teeth especially selected for the kind of cutting you do. We particularly recommend our Band Saws for cutting all kinds of metal of various shapes.

List Prices—Hard Edge

Width, Inches	Thickness	Price per Foot	Price Brazing
¼	.025		
⅜	.025		
½	.025		
⅝	.032		
¾	.032		
1	.035		

When ordering Metal Cutting Band Saw Blades give the length, width, number of teeth to the inch, the class of work to be cut, also the name and style of machine on which the blade is to operate.

Saws are made with 10-12-14-18 and 22 teeth per inch.

You cannot cut all Materials at same rate of speed

Do not expect to cut all materials with the same saw if you want results. A carpenter cannot use the same saw on all work—some requires a rip saw; others a finer saw.

The following table can be used for reference when there is any doubt as to the proper number of teeth to use.

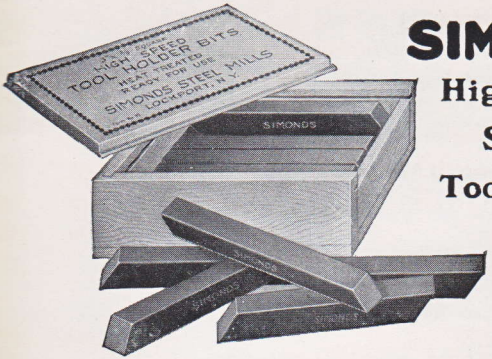
MATERIAL TO BE CUT	NO. OF TEETH PER INCH
Annealed Tool and High Speed Steel	14-12
Machinery and C. R. Steel	14-10
Bronze and Hard Brass	14-12
Soft Yellow Brass	14-12
Aluminum	10
Sheets and Tubing not less than $\frac{1}{8}$" thick	18
Sheets and Tubing less than $\frac{1}{8}$" thick	22
Brass Sheets and Tubing	22-18
Brass and Bronze Castings	14-12
Drill Rod and Light Tool Steel Bars	22-18

Speed recommended:—120 lineal feet per minute.

Here is a point to keep in mind: *the denser the material, the finer should be the teeth of the saw.*

Standard Lengths of Saws

Manufacturer	Name of Machine	Length of Saw
Armstrong Blum Mfg. Co.	Marvel	14'8"
E. R. Klemm	No. 1	11'2"
	No. 2	15'8"
Houghton Richards	6" Machine	12'6"
	9" Machine	13'
	12" Machine	15'5½"
Metal Saw & Machine Co.	Napier	12'3"



SIMONDS
High Speed STEEL Tool Holder Bits

Out-cut Other Makes

One concern turned 550 pieces of high grade tool steel per grinding with a Simonds Bit while they were only able to turn 150 pieces with another make of bit.

These bits are cut to standard tool holder lengths with 30 degree bevel on each end. Finished straight and true to size, ready to be ground and put to work. Carried in stock in 5 lb. and 10 lb. boxes, one size or assorted sizes in each box.

Prices on application

$\frac{1}{4}$" square x $2\frac{1}{2}$" long
$\frac{5}{16}$" square x $2\frac{1}{2}$" long
$\frac{3}{8}$" square x 3" long
$\frac{7}{16}$" square x $3\frac{1}{2}$" long
$\frac{1}{2}$" square x 4" long
$\frac{5}{8}$" square x $4\frac{1}{2}$" long
$\frac{3}{4}$" square x $4\frac{1}{2}$" long

USE SIMONDS FILES

The highest quality file made—

Guaranteed

Best for Machine Shops, Saw Filing and General Use

H-2001

THE DAVIS PRESS WORCESTER MASS. U.S.A.


WARRANTED
The Simonds Saw
WORKS
FITCHBURG, MASS CHICAGO, ILL
U S A
BRANCH HOUSES
NEW YORK, NEW ORLEANS, PORTLAND, ORE
SEATTLE, WASH, SAN FRANCISCO, CAL.
LONDON, ENGLAND. - MONTREAL, P.Q.